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10CV43

Fourth Semester B.E. Degree Examination, June/July 2017
Structural Analysis – I

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Explain with examples statically determinate and indeterminate structures. **(06 Marks)**

b. With usual notations derive an expression to determine strain energy due to bending in a beam. **(08 Marks)**

c. What are one dimensional, two dimensional and three dimensional structures? Give example for each. **(06 Marks)**

2 a. Determine the slope and deflection at the free end of the cantilever beam shown in Fig.Q2(a) by moment area method. EI = 8000 kNm^2. **(10 Marks)**

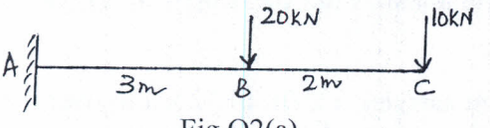

Fig.Q2(a)

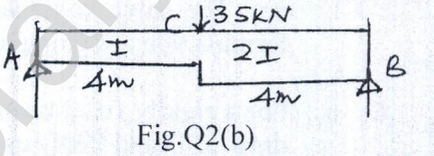

Fig.Q2(b)

b. Using conjugate beam method, find the deflection at point C and slope at A for the simply supported beam loaded as shown Fig.Q2(b). **(10 Marks)**

3 For the frame loaded as shown in Fig.Q3, calculate the vertical deflection at joint D. Take E = 200 kN/mm^2. Areas of each member in mm^2 is shown along the side of the member. Adopt unit load method. **(20 Marks)**

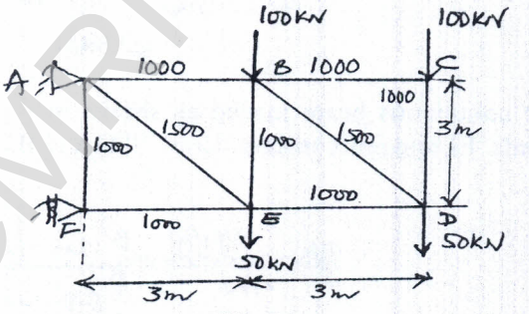

Fig.Q3

4 a. Determine the horizontal and vertical deflection at point C of the frame shown in Fig.Q4(a). E = 200 GPa, I = 6×10^7 mm^4 by strain energy method. **(12 Marks)**

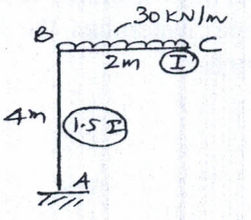

Fig.Q4(a)

b. Compute the deflection and rotation at free end of a cantilever loaded beam loaded as shown in Fig.Q4(b), using strain energy method. **(08 Marks)**

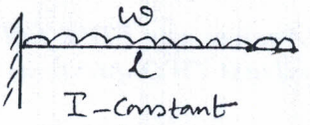

Fig.Q4(b)

PART – B

5 a. A three hinged parabolic arch of span 30 m and central rise of 5 m, is subjected to a concentrated load of 40 kN at 6 m from left support. The right hand half span of the arch is subjected to a UDL of 10 kN/m. Determine the normal thrust, radial shear and bending moment at 6 m from the left support. **(10 Marks)**

b. A suspension cable having support at the same level, has a span of 30m and maximum dip of 3m. The cable is subjected to UDL throughout. Find the length of the cable. Derive the formula you are going to use. **(10 Marks)**

6 a. For a rigidly fixed beam AB of span 5 m carrying a UDL of 12 kN/m over the entire span, draw SFD and BMD using the method of consistent deformation. **(10 Marks)**

b. For the propped cantilever shown in Fig.Q6(b). Compute the reaction at B and draw SFD and BMD. Locate the points of contraflexure if any. Use method of consistent deformation. **(10 Marks)**

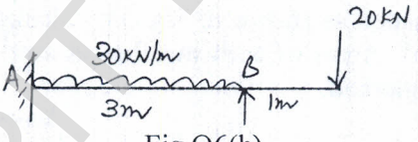

Fig.Q6(b)

7 Analyse the continuous beam loaded as shown in Fig.Q7 by Clapeyron's theorem of the three moments. EI remains constant. Draw SFD and BMD. Mark the salient points. **(20 Marks)**

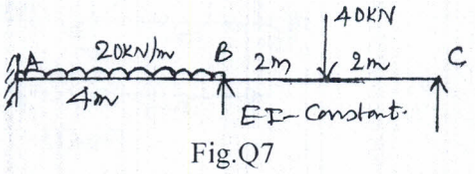

Fig.Q7

8 A two-hinged parabolic arch of span 30m and rise 6 m carries two point loads, each 60 kN, acting at 7.5m and 15m from the left end respectively. The moment of inertia varies as the secant of the slope. Determine the horizontal thrust and maximum positive and negative moments in the arch. **(20 Marks)**

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